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it gives a readable account of many topics, and incidentally furnishes much information upon the general subject of physiology. The cuts are especially serviceable in showing how the student is to proceed. In short, the work comes as near as possible to the perfect manual, which tells enough to be helpful and attractive, and yet leaves the student to ascertain the actual facts for the most part by his own observations upon the living plant or in introductory demonstrations.

The work is all the more satisfactory for being the outgrowth of two preliminary works, the first published in 1894 and the second in 1895, both now out of print.—J. C. ARTHUR.

MINOR NOTICES.

THE SECOND FASCICLE of Ohio fungi, distributed by Professor W. A. Kellerman, of Columbus, O., has been issued, and is larger than the preceding one. It contains twenty-six numbers, of which seven belong to the genus Puccinia, five to Uromyces, three to Ustilago, two each to Gymnoconia and Gymnosporangium, and one each to Aecidium, Gloeosporium, Melampsora, Piggotia, Polystictus, Stereum, and Urocystis. The excellent preparation and fullness of material is maintained. The first fascicle was described in the March number of this journal (p. 239). Although these fascicles are intended for distribution to working mycologists, the author has consented to sell a very limited number at one dollar each.—J. C. ARTHUR.

THE SECOND EDITION[5] of Frost's *Laboratory guide in elementary bacteriology* (8vo) is much more convenient in form than the first (4to) edition.[6] It combines the features of a laboratory outline and of a notebook, blank pages and diagrams being inserted for records of the student's observations. The author recognizes the desirability of uniformity in cultural methods, and gives in addition to the ordinary laboratory methods of preparation of culture media those recommended by the committee on methods of the American Public Health Association. Part I is devoted to general bacteriology, with introductory chapters on morphology, physiology, and taxonomy. In the latter a number of valuable descriptive adjectives, similar to those suggested by Chester, are introduced. Part II deals with medical bacteriology, with appended chapters on animal inoculation and the examination of pathological tissues and fluids. In connection with each exercise are references for the student, both to the principal texts and to original articles on the subject under consideration. The guide is admirably planned and will form a welcome aid in the teaching of bacteriology.—E. E. IRONS.

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[5] FROST, WILLIAM DODGE, A laboratory guide in elementary bacteriology. Second revised edition, pp. x + 355. Madison, Wis.: Published by the author. 1902.

[6] See review in BOT. GAZ. **31** : 439. 1901.

DR. HOLLRUNG[7] has just published his third annual report on plant pathology. This report does not differ in its essential features from the two that have preceded it. The work covers the ground that has been done along the various lines of plant pathology in different countries during the year 1900, and is divided into a general and a special part. The general part brings together (1) the progress made in the organization of plant protection, (2) the laws and ordinances relating to the protection of plants, and (3) the relation of plant diseases to the weather, methods of the dissemination of diseases, the influence of diseased plants upon man and other animals, etc. The special part of the report embraces the work done in 1900 in determining the causes of plant diseases and the means of combating them. The causes of plant diseases are considered, first from the standpoint of injuries from various sources without reference to the host plant, and second the causes of injury to different host plants. Under the former subdivision mention is made of destructive animals, such as field mice and marmots, and the means employed in destroying them; of injurious insects, their development and their control; and of weeds and the means used for their destruction. Under the second subdivision the host plants considered are grains, fodder, sugar beets, white potatoes, sweet potatoes, pod fruits, truck crops, garden products, seed and stone fruits, berries, grapes, timber, tropical plants, and ornamentals. The natural methods of combating plant diseases embrace the work done on birds, insects, fungi, and bacteria injurious to plants; while the artificial methods cover the advances made in the construction of spraying machines, as well as in the preparation of insecticides and fungicides, including powders, liquids, and gases. The report covers about 176 pages, the major portion being devoted to the special part. This is followed by about 90 pages of references to bulletins and papers, subdivided in accordance with the general plan of the work and arranged alphabetically with respect to the names of the authors mentioned under each subdivision. The work closes with a complete index, giving the names of the authors, host plants, insects, fungi, etc., thus making a very satisfactory work of reference. Dr. Hollrung seems to have been very desirous of citing everything published along all lines treated in this report, and considering the great diversity of subjects, together with the wide geographical area covered, it is surprising, and at the same time a matter for congratulation, that the work has been so carefully and so thoroughly performed in every way. In bringing out this report in such a satisfactory manner, Dr. Hollrung has rendered valuable service to all workers along the various lines of plant diseases, and it is to be hoped that he will receive sufficient encouragement to enable him to continue the good work.

[7] HOLLRUNG, DR. M., Jahresberichte ueber die Neuerungen und Leistungen auf dem Gebiete des Pflanzenschutzes. Das Jahr 1900. Pp. viii + 291. Berlin: Paul Parey. 1902. *M* 10.

He closes his preface to this third report with an earnest request that all parties actively engaged in any work relating to plant pathology would forward him separates of their published articles.—C. O. TOWNSEND.

NOTES FOR STUDENTS.

PROTOPLASMIC CONNECTIONS in a large number of plants belonging to all groups from algae to flowering plants have been studied recently by Keinitz-Gerloff.[8] Previous investigations have already made it seem probable that protoplasmic connections are universally present in the spermatophytes; the present work shows that the connections are as uniformly present in the lower groups, the filamentous algae perhaps being an exception. In such algae, however, each cell is so independent in nutrition and reproduction that the absence of connections need not occasion surprise. The suggestion is made that the connections may not be derived wholly from the *Hautschicht*, but that they may have a core of trophoplasm surrounded by *Hautschicht*. The theory that the connections conduct stimuli and materials is supported, but the reviewer believes that the whole subject needs further investigation.—CHARLES J. CHAMBERLAIN.

THE PHYSIOLOGY of adjustment to poisons dissolved in the medium has been made the subject of a contribution by Pulst.[9] He worked with the Mucor, Aspergillus, Botrytis, and Penicillium. The effect of a number of kations was determined, among them Cu, Zn, Hg, Ni, Co, Cd, Pb, etc. The anion SO_4 was usually used, but some others (*e. g.*, $C_4H_4O_6$, CN, NO_3, Cl, etc.) also appear in the tables. Penicillium withstands a much higher concentration of these substances than do the other three moulds. The effect of a salt upon the plant appears to depend in great measure upon the electrical charge of the kation, also in part upon the action of undissociated molecules. As was known before, a gradual increase in concentration brings about an accommodation to much stronger solutions than could be withstood if the change were made suddenly. Copper ions appear to be unable to penetrate the protoplast of Penicillium, though the other protoplasts studied are readily permeable to them.—B. E. LIVINGSTON.

ACCORDING TO SHIBATA,[10] the fertilization of the egg and polar nuclei of *Monotropa uniflora* is practically the same as has been observed in all the forms in which double fertilization is known. The sperms are elongated when they enter the embryo sac, and become more nearly spherical as fusion progresses.

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[8] Neue Studien über Plasmodesmen. Ber. Deutsch. Bot. Gesell. **20**: 93–117. *pl. 4.* 1902.

[9] PULST, C., Die Widerstandsfähigkeit einiger Schimmelpilze gegen Metallgifte. Jahrb. Wiss. Bot. 37: 205–263. 1902.

[10] SHIBATA, K., Die Doppelbefruchtung bei *Monotropa uniflora* L. Flora **90**: 61–66. 1902.